



# 11

# SEQUENCE LISTING

<110> GISSMANN, et al.

<120> PAPILLOMA VIRUS CAPSOMERE VACCINE FORMULATIONS AND METHODS OF USE

<130> 27013/38150

<140> US 10/042,526

<141> 2002-01-08

<150> US 09/632,286

<151> 2000-08-03

<150> US 08/944,368

<151> 1997-10-06

<160> 28

<170> PatentIn version 3.3

<210> 1

<211> 1518

<212> DNA

<213> Human Papilloma Virus

<220>

<221> CDS

<222> (1)..(1518)

<400> 1

atg tct ctt tgg ctg cct agt gag gcc act gtc tac ttg cct cct gtc	48
Met Ser Leu Trp Leu Pro Ser Glu Ala Thr Val Tyr Leu Pro Pro Val	
1 5 10 15	
cca gta tct aag gtt gta agc acg gat gaa tat gtt gca cgc aca aac	96
Pro Val Ser Lys Val Val Ser Thr Asp Glu Tyr Val Ala Arg Thr Asn	
20 25 30	
ata tat tat cat gca gga aca tcc aga cta ctt gca gtt gga cat ccc	144
Ile Tyr Tyr His Ala Gly Thr Ser Arg Leu Leu Ala Val Gly His Pro	
35 40 45	
tat ttt cct att aaa aaa cct aac aat aac aaa ata tta gtt cct aaa	192
Tyr Phe Pro Ile Lys Lys Pro Asn Asn Asn Lys Ile Leu Val Pro Lys	
50 55 60	
gta tca gga tta caa tac agg gta ttt aga ata cat tta cct gac ccc	240
Val Ser Gly Leu Gln Tyr Arg Val Phe Arg Ile His Leu Pro Asp Pro	
65 70 75 80	
aat aag ttt ggt ttt cct gac acc tca ttt tat aat cca gat aca cag	288
Asn Lys Phe Gly Phe Pro Asp Thr Ser Phe Tyr Asn Pro Asp Thr Gln	
85 90 95	
cgg ctg gtt tgg gcc tgt gta ggt gtt gag gta ggt cgt ggt cag cca	336
Arg Leu Val Trp Ala Cys Val Gly Val Glu Val Gly Arg Gly Gln Pro	
100 105 110	
tta ggt gtg ggc att agt ggc cat cct tta tta aat aaa ttg gat gac	384
Leu Gly Val Gly Ile Ser Gly His Pro Leu Leu Asn Lys Leu Asp Asp	
115 120 125	

aca gaa aat gct agt gct tat gca gca aat gca ggt gtg gat aat aga Thr Glu Asn Ala Ser Ala Tyr Ala Ala Asn Ala Gly Val Asp Asn Arg 130 135 140	432
gaa tgt ata tct atg gat tac aaa caa aca caa ttg tgt tta att ggt Glu Cys Ile Ser Met Asp Tyr Lys Gln Thr Gln Leu Cys Leu Ile Gly 145 150 155 160	480
tgc aaa cca cct ata ggg gaa cac tgg ggc aaa gga tcc cca tgt acc Cys Lys Pro Pro Ile Gly Glu His Trp Gly Lys Gly Ser Pro Cys Thr 165 170 175	528
aat gtt gca gta aat cca ggt gat tgt cca cca tta gag tta ata aac Asn Val Ala Val Asn Pro Gly Asp Cys Pro Pro Leu Glu Leu Ile Asn 180 185 190	576
aca gtt att cag gat ggt gat atg gtt gat act ggc ttt ggt gct atg Thr Val Ile Gln Asp Gly Asp Met Val Asp Thr Gly Phe Gly Ala Met 195 200 205	624
gac ttt act aca tta cag gct aac aaa agt gaa gtt cca ctg gat att Asp Phe Thr Thr Leu Gln Ala Asn Lys Ser Glu Val Pro Leu Asp Ile 210 215 220	672
tgt aca tct att tgc aaa tat cca gat tat att aaa atg gtg tca gaa Cys Thr Ser Ile Cys Lys Tyr Pro Asp Tyr Ile Lys Met Val Ser Glu 225 230 235 240	720
cca tat ggc gac agc tta ttt ttt tat tta cga agg gaa caa atg ttt Pro Tyr Gly Asp Ser Leu Phe Phe Tyr Leu Arg Arg Glu Gln Met Phe 245 250 255	768
gtt aga cat tta ttt aat agg gct ggt gct gtt ggt gaa aat gta cca Val Arg His Leu Phe Asn Arg Ala Gly Ala Val Gly Glu Asn Val Pro 260 265 270	816
gac gat tta tac att aaa ggc tct ggg tct act gca aat tta gcc agt Asp Asp Leu Tyr Ile Lys Gly Ser Gly Ser Thr Ala Asn Leu Ala Ser 275 280 285	864
tca aat tat ttt cct aca cct agt ggt tct atg gtt acc tct gat gcc Ser Asn Tyr Phe Pro Thr Pro Ser Gly Ser Met Val Thr Ser Asp Ala 290 295 300	912
caa ata ttc aat aaa cct tat tgg tta caa cga gca cag ggc cac aat Gln Ile Phe Asn Lys Pro Tyr Trp Leu Gln Arg Ala Gln Gly His Asn 305 310 315 320	960
aat ggc att tgt tgg ggt aac caa cta ttt gtt act gtt gtt gat act Asn Gly Ile Cys Trp Gly Asn Gln Leu Phe Val Thr Val Val Asp Thr 325 330 335	1008
aca cgc agt aca aat atg tca tta tgt gct gcc ata tct act tca gaa Thr Arg Ser Thr Asn Met Ser Leu Cys Ala Ala Ile Ser Thr Ser Glu 340 345 350	1056
act aca tat aaa aat act aac ttt aag gag tac cta cga cat ggg gag Thr Thr Tyr Lys Asn Thr Asn Phe Lys Glu Tyr Leu Arg His Gly Glu 355 360 365	1104
gaa tat gat tta cag ttt att ttt caa ctg tgc aaa ata acc tta act Glu Tyr Asp Leu Gln Phe Ile Phe Gln Leu Cys Lys Ile Thr Leu Thr 370 375 380	1152

gca gac gtt atg aca tac ata cat tct atg aat tcc act att ttg gag	1200
Ala Asp Val Met Thr Tyr Ile His Ser Met Asn Ser Thr Ile Leu Glu	
385 390 395 400	
gac tgg aat ttt ggt cta caa cct ccc cca gga ggc aca cta gaa gat	1248
Asp Trp Asn Phe Gly Leu Gln Pro Pro Pro Gly Gly Thr Leu Glu Asp	
405 410 415	
act tat agg ttt gta acc tcc cag gca att gct tgt caa aaa cat aca	1296
Thr Tyr Arg Phe Val Thr Ser Gln Ala Ile Ala Cys Gln Lys His Thr	
420 425 430	
cct cca gca cct aaa gaa gat ccc ctt aaa aaa tac act ttt tgg gaa	1344
Pro Pro Ala Pro Lys Glu Asp Pro Leu Lys Lys Tyr Thr Phe Trp Glu	
435 440 445	
gta aat tta aag gaa aag ttt tct gca gac cta gat cag ttt cct tta	1392
Val Asn Leu Lys Glu Lys Phe Ser Ala Asp Leu Asp Gln Phe Pro Leu	
450 455 460	
gga cgc aaa ttt tta cta caa gca gga ttg aag gcc aaa cca aaa ttt	1440
Gly Arg Lys Phe Leu Leu Gln Ala Gly Leu Lys Ala Lys Pro Lys Phe	
465 470 475 480	
aca tta gga aaa cga aaa gct aca ccc acc acc tca tct acc tct aca	1488
Thr Leu Gly Lys Arg Lys Ala Thr Pro Thr Thr Ser Ser Thr Thr	
485 490 495	
act gct aaa cgc aaa aaa cgt aag ctg taa	1518
Thr Ala Lys Arg Lys Lys Arg Lys Leu	
500 505	

<210> 2  
 <211> 505  
 <212> PRT  
 <213> Human Papilloma Virus

<400> 2

Met Ser Leu Trp Leu Pro Ser Glu Ala Thr Val Tyr Leu Pro Pro Val	
1 5 10 15	
Pro Val Ser Lys Val Val Ser Thr Asp Glu Tyr Val Ala Arg Thr Asn	
20 25 30	
Ile Tyr Tyr His Ala Gly Thr Ser Arg Leu Leu Ala Val Gly His Pro	
35 40 45	
Tyr Phe Pro Ile Lys Lys Pro Asn Asn Asn Lys Ile Leu Val Pro Lys	
50 55 60	
Val Ser Gly Leu Gln Tyr Arg Val Phe Arg Ile His Leu Pro Asp Pro	
65 70 75 80	
Asn Lys Phe Gly Phe Pro Asp Thr Ser Phe Tyr Asn Pro Asp Thr Gln	
85 90 95	

Arg Leu Val Trp Ala Cys Val Gly Val Glu Val Gly Arg Gly Gln Pro  
 100 105 110

Leu Gly Val Gly Ile Ser Gly His Pro Leu Leu Asn Lys Leu Asp Asp  
 115 120 125

Thr Glu Asn Ala Ser Ala Tyr Ala Ala Asn Ala Gly Val Asp Asn Arg  
 130 135 140

Glu Cys Ile Ser Met Asp Tyr Lys Gln Thr Gln Leu Cys Leu Ile Gly  
 145 150 155 160

Cys Lys Pro Pro Ile Gly Glu His Trp Gly Lys Gly Ser Pro Cys Thr  
 165 170 175

Asn Val Ala Val Asn Pro Gly Asp Cys Pro Pro Leu Glu Leu Ile Asn  
 180 185 190

Thr Val Ile Gln Asp Gly Asp Met Val Asp Thr Gly Phe Gly Ala Met  
 195 200 205

Asp Phe Thr Thr Leu Gln Ala Asn Lys Ser Glu Val Pro Leu Asp Ile  
 210 215 220

Cys Thr Ser Ile Cys Lys Tyr Pro Asp Tyr Ile Lys Met Val Ser Glu  
 225 230 235 240

Pro Tyr Gly Asp Ser Leu Phe Phe Tyr Leu Arg Arg Glu Gln Met Phe  
 245 250 255

Val Arg His Leu Phe Asn Arg Ala Gly Ala Val Gly Glu Asn Val Pro  
 260 265 270

Asp Asp Leu Tyr Ile Lys Gly Ser Gly Ser Thr Ala Asn Leu Ala Ser  
 275 280 285

Ser Asn Tyr Phe Pro Thr Pro Ser Gly Ser Met Val Thr Ser Asp Ala  
 290 295 300

Gln Ile Phe Asn Lys Pro Tyr Trp Leu Gln Arg Ala Gln Gly His Asn  
 305 310 315 320

Asn Gly Ile Cys Trp Gly Asn Gln Leu Phe Val Thr Val Val Asp Thr  
 325 330 335

Thr Arg Ser Thr Asn Met Ser Leu Cys Ala Ala Ile Ser Thr Ser Glu  
 340 345 350

Thr Thr Tyr Lys Asn Thr Asn Phe Lys Glu Tyr Leu Arg His Gly Glu  
 355 360 365

Glu Tyr Asp Leu Gln Phe Ile Phe Gln Leu Cys Lys Ile Thr Leu Thr  
 370 375 380

Ala Asp Val Met Thr Tyr Ile His Ser Met Asn Ser Thr Ile Leu Glu  
 385 390 395 400

Asp Trp Asn Phe Gly Leu Gln Pro Pro Pro Gly Gly Thr Leu Glu Asp  
 405 410 415

Thr Tyr Arg Phe Val Thr Ser Gln Ala Ile Ala Cys Gln Lys His Thr  
 420 425 430

Pro Pro Ala Pro Lys Glu Asp Pro Leu Lys Lys Tyr Thr Phe Trp Glu  
 435 440 445

Val Asn Leu Lys Glu Lys Phe Ser Ala Asp Leu Asp Gln Phe Pro Leu  
 450 455 460

Gly Arg Lys Phe Leu Leu Gln Ala Gly Leu Lys Ala Lys Pro Lys Phe  
 465 470 475 480

Thr Leu Gly Lys Arg Lys Ala Thr Pro Thr Thr Ser Ser Thr Ser Thr  
 485 490 495

Thr Ala Lys Arg Lys Lys Arg Lys Leu  
 500 505

<210> 3  
 <211> 297  
 <212> DNA  
 <213> Human Papilloma Virus

<220>  
 <221> CDS  
 <222> (1)..(297)

<400> 3  
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 Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln  
 1 5 10 15  
 cca gag aca act gat ctc tac tgt tat gag caa tta aat gac agc tca 96  
 Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser Ser  
 20 25 30  
 gag gag gag gat gaa ata gat ggt cca gct gga caa gca gaa ccg gac 144  
 Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp  
 35 40 45

aga gcc cat tac aat att gta acc ttt tgt tgc aag tgt gac tct acg 192  
 Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr  
 50 55 60

ctt cgg ttg tgc gta caa agc aca cac gta gac att cgt act ttg gaa 240  
 Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu  
 65 70 75 80

gac ctg tta atg ggc aca cta gga att gtg tgc ccc atc tgt tct cag 288  
 Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser Gln  
 85 90 95

aaa cca taa 297  
 Lys Pro

<210> 4  
 <211> 98  
 <212> PRT  
 <213> Human Papilloma Virus  
 <400> 4

Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln  
 1 5 10 15

Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser Ser  
 20 25 30

Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp  
 35 40 45

Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr  
 50 55 60

Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu  
 65 70 75 80

Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser Gln  
 85 90 95

Lys Pro

<210> 5  
 <211> 34  
 <212> DNA  
 <213> Artificial sequence

<220>  
 <223> Synthetic primer

<400> 5  
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34

<210> 6  
 <211> 35  
 <212> DNA  
 <213> Artificial sequence  
  
 <220>  
 <223> Synthetic primer  
  
 <400> 6  
 ccccgatatc tcaaattatt ttctacacc tagtg 35  
  
 <210> 7  
 <211> 40  
 <212> DNA  
 <213> Artificial sequence  
  
 <220>  
 <223> Synthetic primer  
  
 <400> 7  
 aaagatatct tgtagtaaaa atttgogtcc taaaggaaac 40  
  
 <210> 8  
 <211> 44  
 <212> DNA  
 <213> Artificial sequence  
  
 <220>  
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 <400> 8  
 aaagatatct aatctacctc tacaactgct aaacgcaaaa aacg 44  
  
 <210> 9  
 <211> 35  
 <212> DNA  
 <213> Artificial sequence  
  
 <220>  
 <223> Synthetic primer  
  
 <400> 9  
 aaaagatatc atgcatggag atacacctac attgc 35  
  
 <210> 10  
 <211> 34  
 <212> DNA  
 <213> Artificial sequence  
  
 <220>  
 <223> Synthetic primer  
  
 <400> 10  
 ttttgatatc ggctctgtcc ggttctgctt gtcc 34  
  
 <210> 11  
 <211> 44  
 <212> DNA

<213> Artificial sequence  
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 <223> Synthetic primer  
 <400> 11  
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 <210> 12  
 <211> 35  
 <212> DNA  
 <213> Artificial sequence  
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 <223> Synthetic primer  
 <400> 12  
 aaaagatatc tggtttctga gaacagatgg ggcac 35  
 <210> 13  
 <211> 38  
 <212> DNA  
 <213> Artificial sequence  
 <220>  
 <223> Synthetic primer  
 <400> 13  
 ttttgatatc gattatgagc aattaaatga cagctcag 38  
 <210> 14  
 <211> 35  
 <212> DNA  
 <213> Artificial sequence  
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 <223> Synthetic primer  
 <400> 14  
 ttttgatatc gtctacgtgt gtgctttgta cgcac 35  
 <210> 15  
 <211> 39  
 <212> DNA  
 <213> Artificial sequence  
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 <223> Synthetic primer  
 <400> 15  
 tttatcgata tcggtccagc tggacaagca gaaccggac 39  
 <210> 16  
 <211> 39  
 <212> DNA  
 <213> Artificial sequence  
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<223> Synthetic primer

<400> 16

ttttgatatc gatgccatt acaatattgt aaccttttg

39

<210> 17

<211> 294

<212> DNA

<213> Human Papilloma Virus

<220>

<221> CDS

<222> (1)..(294)

<400> 17

atg agt ctt cta acc gag gtc gaa acg ctt acc aga aac gga tgg gag 48  
Met Ser Leu Leu Thr Glu Val Glu Thr Leu Thr Arg Asn Gly Trp Glu  
1 5 10 15

tgc aaa tgc agc gat tca agt gat cct ctc att atc gca gcg agt atc 96  
Cys Lys Cys Ser Asp Ser Ser Asp Pro Leu Ile Ile Ala Ala Ser Ile  
20 25 30

att ggg atc ttg cac ttg ata ttg tgg att ttt tat cgt ctt ttc ttc 144  
Ile Gly Ile Leu His Leu Ile Leu Trp Ile Phe Tyr Arg Leu Phe Phe  
35 40 45

aaa tgc att tat cgt cgc ctt aaa tac ggt ttg aaa aga ggg cct tct 192  
Lys Cys Ile Tyr Arg Arg Leu Lys Tyr Gly Leu Lys Arg Gly Pro Ser  
50 55 60

acg gaa gga gcg cct gag tct atg agg gaa gaa tat cgg cag gaa cag 240  
Thr Glu Gly Ala Pro Glu Ser Met Arg Glu Glu Tyr Arg Gln Glu Gln  
65 70 75 80

cag agt gct gtg gat gtt gac gat gtt cat ttt gtc aac ata gag ctg 288  
Gln Ser Ala Val Asp Val Asp Asp Val His Phe Val Asn Ile Glu Leu  
85 90 95

gag taa 294  
Glu

<210> 18

<211> 97

<212> PRT

<213> Human Papilloma Virus

<400> 18

Met Ser Leu Leu Thr Glu Val Glu Thr Leu Thr Arg Asn Gly Trp Glu  
1 5 10 15

Cys Lys Cys Ser Asp Ser Ser Asp Pro Leu Ile Ile Ala Ala Ser Ile  
20 25 30

Ile Gly Ile Leu His Leu Ile Leu Trp Ile Phe Tyr Arg Leu Phe Phe  
35 40 45

Lys Cys Ile Tyr Arg Arg Leu Lys Tyr Gly Leu Lys Arg Gly Pro Ser  
 50 55 60

Thr Glu Gly Ala Pro Glu Ser Met Arg Glu Glu Tyr Arg Gln Glu Gln  
 65 70 75 80

Gln Ser Ala Val Asp Val Asp Asp Val His Phe Val Asn Ile Glu Leu  
 85 90 95

Glu

<210> 19  
 <211> 40  
 <212> DNA  
 <213> Artificial sequence

<220>  
 <223> Synthetic primer

<400> 19  
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<210> 20  
 <211> 35  
 <212> DNA  
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<220>  
 <223> Synthetic primer

<400> 20  
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<210> 21  
 <211> 24  
 <212> DNA  
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<220>  
 <223> Synthetic primer

<400> 21  
 gttatgacat acatacatc tatg 24

<210> 22  
 <211> 35  
 <212> DNA  
 <213> Artificial sequence

<220>  
 <223> Synthetic primer

<400> 22  
 ccatgcattc ctgctttag taaaaatttg cgtcc 35

<210> 23  
 <211> 29  
 <212> DNA  
 <213> Artificial sequence  
  
 <220>  
 <223> Synthetic primer  
  
 <400> 23  
 ctacaagcag gaatgcatgg agatacacc 29  
  
 <210> 24  
 <211> 36  
 <212> DNA  
 <213> Artificial sequence  
  
 <220>  
 <223> Synthetic primer  
  
 <400> 24  
 catctgaagc ttagtaatgg gctctgtccg gttctg 36  
  
 <210> 25  
 <211> 38  
 <212> DNA  
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 <220>  
 <223> Synthetic primer  
  
 <400> 25  
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 <223> Synthetic primer  
  
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 <210> 27  
 <211> 69  
 <212> DNA  
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 <220>  
 <223> Synthetic primer  
  
 <400> 27  
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 ctctgtccg 69

<210> 28  
<211> 47  
<212> DNA  
<213> Artificial sequence

<220>  
<223> Synthetic primer

<400> 28  
catctgaagc ttattgtacg cacaaccgaa gcgtagagtc acacttg

47